What is Claimed:

1. A method of determining range from a moving platform to an emitter comprising the steps of:

(a) receiving a RF signal from the emitter;

(b) counting a number of phase reversals of the received RF signal during a period of time;

(c) measuring a Doppler frequency during the period of time; and

(d) determining the range to the emitter based on both the number of phase reversals counted in step (b) and the Doppler frequency measured in step (c).

2. The method of claim 1 wherein

step (b) includes counting the number of phase reversals of the received RF signal during the period of time the moving platform traverses a distance.

3. The method of claim 2 further including the step of:

(e) measuring the distance traversed by the moving platform during the period of time; and

step (d) includes determining the range to the emitter based on the number of phase reversals counted in step (b), the Doppler frequency measured in step (c) and the distance measured in step (e).

4. The method of claim 3 wherein

measuring the distance includes obtaining geographic position data at each end of the distance traversed by the moving platform, using one of an inertial navigation system (INS), a Global Positioning System (GPS), and a combination of an INS and GPS.

5. The method of claim 3 wherein step (d) includes

forming a first triangle having (i) a first side being a function of the distance traversed by the moving platform, (ii) a second side being a function of the counted number of phase reversals of the received RF signal, and (iii) a third side being a function of a Law of Cosines, in which an angle α between the first side and the second side is a function of the measured Doppler frequency, and

determining the range to the emitter using the formed first triangle.

6. The method of claim 5 wherein step (d) includes

forming an equilateral triangle in which (i) a base of the equilateral triangle is the third side of the first triangle, and (ii) two equal sides of the equilateral triangle, each side denoted by R, are a function of the angle α, and

determining the range to the emitter includes combining a side R of the equilateral triangle and the second side of the first triangle.

7. The method of claim 3 wherein

measuring the distance includes measuring the distance during a predetermined period of time having a value ranging between 1 second and 20 seconds.

8. The method of claim 3 wherein

step (c) of measuring the Doppler frequency includes measuring variations in the Doppler frequency during the period of time, the variations denoted by Δfd,

in which $1/\Delta fd$ is approximately a width between 3dB power points of a main lobe of an autocorrelation function of the Doppler frequency.

9. The method of claim 2 wherein

receiving the RF signal includes receiving one of a pulsed Doppler signal and a CW signal.

10. The method of claim 2 further including the steps of:

(e) mixing the received RF signal with an oscillator signal to produce an intermediate frequency (IF) signal;

(f) converting the IF signal into a digital signal;

(g) storing the digital signal in a memory; and

(h) providing the digital signal for counting the number of phase reversals in step (b).

11. The method of claim 10 wherein

step (e) includes mixing the received RF signal with a numerically controlled oscillator (NCO) signal to produce a phase coherent IF signal.

12. A method of determining range from a moving platform to an emitter comprising the steps of:

(a) receiving a RF signal from the emitter during a period of time the moving platform traverses a distance, the distance denoted by b;

(b) determining a carrier wavelength, λ, of the RF signal;

(c) counting a number of phase reversals of the received RF signal during the period of time, the number denoted by N;

(d) determining a range differential, ΔR, between the moving platform and the emitter during the period of time, in which

$$\Delta R = N\lambda;$$

(e) measuring a Doppler frequency, fd, during the period of time; and

(f) determining the range to the emitter based on the distance b, the range differential ΔR and the Doppler frequency fd.

13. The method of claim 12 wherein

determining the range to the emitter includes calculating an angle α using the following expression:

$$fd = v^* \cos\alpha^* 1/\lambda$$

wherein

v is a velocity vector of the moving platform transversing the distance b,

α is an angle formed between the velocity vector v and the range differential ΔR.

14. The method of claim 13 wherein

determining the range to the emitter includes forming a first triangle having (i) a first side being the distance b, (ii) a second side being $N\lambda$, and (iii) a third side, d, computed by using a Law of Cosines including the first side, the angle α and the second side.

15. The method of claim 14 wherein

determining the range to the emitter includes forming an equilateral triangle in which (i) a base of the equilateral triangle is d and (ii) two equal sides of the equilateral triangle, each denoted by R, are a function of the angle α and the base d, and

determining the range to the emitter includes combining R and $N\lambda$.

16. An apparatus, installed onboard a moving platform, for determining range from the moving platform to an emitter comprising

a receiver for receiving a RF signal from the emitter,

an analog to digital converter (ADC) for converting the received RF signal into a digital signal,

a memory for storing the digital signal provided by the ADC, and

a processor coupled to the memory for extracting the stored digital signal, and (a) counting a number of phase reversals of the digital signal during a period of time, (b) measuring a Doppler frequency during the period of time, and (c) determining the range to the emitter using both the counted number of phase reversals and the measured Doppler frequency.

17. The apparatus of claim 16 including

a GPS receiver coupled to the processor for obtaining geographic position of the moving platform, and

the processor determining a distance traversed by the moving platform during the period of time based on the geographic position obtained from the GPS receiver.

18. The apparatus of claim 16 including

a mixer coupled between the receiver and the ADC for converting the received RF signal into an IF signal,

wherein the ADC converts the IF signal into the digital signal.

19. The apparatus of claim 18

wherein the mixer is coupled to a NCO for providing a coherent signal to the mixer, and

the mixer combines the received RF signal and the coherent signal to provide the IF signal.

20 The apparatus of claim 16

wherein the processor measures a plurality of Doppler frequencies during the time period, and

the processor includes an autocorrelation function for autocorrelating the plurality of Doppler frequencies measured during the time period and obtaining an averaged Doppler frequency based on results of the autocorrelation function.